

Health Care Innovation and Interoperability: Value Left on the Table Today, Consumer and Clinician Empowerment Tomorrow

“Americans would be appalled if they fully realized the amount of health care decisions being made by their doctors without full access to information,” Michael Schatzlein, MD, CEO, Saint Thomas Health and Indiana/Tennessee Market Leader, Ascension Health



RICHARD W. SINGERMAN, PH.D.

Overview

Health Care Innovation Day: Igniting an Interoperable Health System was sponsored by the West Health Institute and the Department of Health and Human Services Office of the National Coordinator for Health Information Technology in Washington, D.C., on Feb. 6, 2014. This article presents themes from Innovation Day including the adverse impact that poor interoperability has on patient safety, clinician performance and hospital operational performance. Next the

Richard Singerman is an adjunct assistant professor in the Johns Hopkins School of Medicine, Division of Health Sciences Informatics. He is also chief innovation officer for Trust-NetMD, which specializes in combining organizational learning principles and social media technologies into “social learning solutions” for communicating evidence-based medicine, fostering patient-centered outcomes research and accelerating translational research. He has previously served as associate partner in IBM’s Healthcare Analytics Practice, special expert in the HHS Office of the National Coordinator for Health IT and director of innovation advancement for Ascension Health. He can be reached at rws@alum.mit.edu.

article highlights lessons learned from other industries that have dealt with interoperability challenges including telecom, national intelligence and music. Finally, the article synthesizes in a visual format a key interoperability use case that combines Veterans Affairs/Centers for Medicare & Medicaid Services Blue Button capabilities with the smartphone app marketplace to empower consumers and clinicians. This use case can be realized and adopted by multiple health systems in the short term, fosters consumer and clinician empowerment and advances the realization of the Institutes of Medicine vision for a Learning Health System.

Urgency: Interoperability’s Impact on Patient Safety

Interoperability¹ is defined as the ability of two systems to exchange information and the ability of the receiving system to use that information. Hence interoperability of information is defined within the context of what you want to do with that information. So, if the in-

¹ Doug Fridsma, MD, PhD, Chief Science Officer, U.S. Dept. Health & Human Services, Office of the National Coordinator for Health IT

teroperability of health information systems and medical devices is so important, why aren't we there yet?

Clinicians are making decisions based on incomplete information, not because the information doesn't exist but because they can't access the information across organizational silos.

What columnist Malcolm Gladwell² said is important. Before you have a movement you need a sense of urgency. Does that urgency exist for interoperability? Clinicians are making decisions based on incomplete information, not because the information doesn't exist but because they can't access the information across organizational silos. Consider the critical timing around labor and delivery. We heard from Dr. Neal Chawla³ of the private practice obstetricians delivering at Virginia's INOVA Health System. During an expectant mother's OB visits leading up to delivery, her prenatal labs for nine months go to LabCorp or Quest Diagnostics. Then the expectant mother shows up at the hospital to deliver. The prenatal lab results, however, are often on paper or in an electronic format from the OB's electronic health record (EHR) that doesn't interoperate with the hospital's EHR. Hence, Dr. Chawla and his colleagues at the hospital end up making decisions based on incomplete information. In another case, we poignantly heard from nurse Sarah McGregor⁴ inside the neonatal intensive care unit (NICU) of Virginia's Nationwide Children's Hospital. It's very challenging in cases of high risk newborns delivered at a community hospital and rapidly transferred to the specialty hospital's NICU to get timely data (e.g. getting the newborn's first blood gas data⁵ in the first six hours of life from the community hospital to the specialty hospital). Nurse McGregor has multiple medical devices plugged into her newborns but she can't get the information in one place, treat the critical newborn and chart her procedures simultaneously. First and foremost, the lack of timely information access for Dr. Chawla, nurse McGregor and their colleagues in labor and delivery is a clear and present danger to patient safety—urgent indeed.

² Malcolm Gladwell, Author of *The Tipping Point*, *Blink*, *Outliers*, *What the Dog Saw*, and *David and Goliath*

³ Neal Chawla, MD, ER Physician, Associate Chief Medical Informatics Officer at INOVA Health System

⁴ Sarah McGregor, RN, Neonatal Nurse, Nationwide Children's Hospital

⁵ Robert T. Brouillette, David H. Waxman, Evaluation of the Newborn's Blood Gas Status, *Clinical Chemistry* Jan 1997 vol 43 no 1 215-221

Supply and Demand: Interoperability's Impact on Hospital Operations and Clinician Workforce

Is there the business case for interoperability for both health care providers and health IT vendors? We heard above from health care providers about decisions made with incomplete information due to the inability to access and/or compute information across organizational silos. Additionally we heard from Robert Wood Johnson University Hospital leadership⁶ about the millions of dollars his organization spends annually on information system and medical device custom interfaces due to lack of interoperability. And even with these custom interfaces, interoperability issues are still costing the physicians at this hospital an hour a day—a clear waste problem measured at the consumer-clinician level that must be fixed⁷. Continuing on this theme, we heard from Nashville's Saint Thomas Health leadership⁸ that the unappreciated cost of interoperability is the “energy it is sapping from physicians and nurses.” This goes right to the heart of adversely impacting one of St. Thomas' core values, “enriching the lives of care givers.”

Effective information sharing will happen when it's within the interest of buyers (payers and providers) and vendors together. There needs to be the follow on from the development of standards to the business case for adopting standards.

Look at the vendor side of the interoperability supply and demand curve. The *Healthcare Innovation Day* attendees were pretty tough on the health IT vendors. A survey of *Healthcare Innovation Day* registrants (over 1,500) found that 58 percent thought that health IT vendor lock-in was primarily responsible for holding back interoperability. We don't know what goes on at every level of the vendor. But is this view of vendors accurate? And even if it is accurate, what should be done about it? One could argue that effective information sharing will happen when it's within the interest of buyers (payers and providers) and vendors together. There needs to be the follow on from the development of standards to the

⁶ Stephen Jones, CEO, Robert Wood Johnson University Hospital

⁷ Michael E. Porter and Thomas H. Lee, “The Strategy that will Fix Health Care,” *Harvard Business Review*, October 2013

⁸ Michael Schatzlein, MD, CEO, Saint Thomas Health and Indiana/Tennessee Market Leader, Ascension Health

To request permission to reuse or share this document, please contact permissions@bna.com. In your request, be sure to include the following information: (1) your name, company, mailing address, email and telephone number; (2) name of the document and/or a link to the document PDF; (3) reason for request (what you want to do with the document); and (4) the approximate number of copies to be made or URL address (if posting to a website).

business case for adopting standards⁹. Both the vendor and the health care provider have to be ready to innovate. And not all vendors have it on their priority list to move forward when only their most innovative customers are ready to innovate. For example one large academic medical system that is using a major health IT vendor wants to develop its own data model (based on discussions with health IT leaders at this academic medical center) which can be key for enabling both interoperability and advanced analytics capabilities. But this custom data model is not on the vendor's roadmap, so this custom data model is not happening today.

Some health systems are making interoperability happen. If you look at Texas Health Resources (based on discussions with THR leadership), it has multiple hospitals and multiple clinician group practices (over 5,000 affiliated physicians), and they are moving forward in driving sophisticated information exchange between the hospitals and physicians. Indeed, it built its own private health information exchange (HIE) even though there were three HIEs already in the state. It also recently launched an accountable care organization (ACO) so it is now within its business interest to share that information and it's happening. So, one can conclude that if there is the organizational will and business case from the provider perspective, and the organizational will and business case from the vendor perspective, then solutions will be realized. And vendors who participate in these solutions will be well poised as the provider market makes further demands for them.

Lessons From Other Industries: Telecom, National Intelligence and Music

With respect to achieving interoperability, what can we learn from other industries? To address issues such as technology development and business case misalignment between vendor development and provider need, the Center for Medical Interoperability (CMI)¹⁰ is taking a page from the National Cable & Telecommunications Association (NCTA)¹¹ playbook by fostering multi-stakeholder research and development. CMI was created to advance health care safety, quality, and affordability by delivering widespread interoperability by:

- (a) providing a member-centric environment for its health system members;
- (b) providing a neutral environment for multi-stakeholder R&D;
- (c) employing and/or hosting technical expertise for shared member problems;
- (d) conducting its activities in an equitable and transparent fashion.

By comparison, NCTA launched CableLabs as a consortia-sponsored R&D entity on behalf of the telecom industry as a whole to address common issues. How did the cable industry overcome the problem of si-

los of information? CableLabs created a prioritization of interoperability objectives for their industry. Then cable labs set an R&D roadmap for their industry and executed on it to reach the objectives. In short, for enhancing health information system and medical device interoperability, emulating CableLab's multi-stakeholder R&D is viewed as a promising path forward toward joint health care provider and health care vendor interoperability readiness.

From the National Intelligence Community, health care can learn from Sid Fuchs¹² (from the Healthcare Innovation Day cross-industry panel). By analogy to interoperability challenges in his former CIA days, Fuchs noted that health care can start on the path to information sharing "without signing up for a marathon." Prior to 9/11 the Intelligence Community had to overcome the "not invented here" mentality. 9/11 created a sense of urgency. Additionally, the Intelligence Community knew that technology solutions didn't happen overnight. Fuchs made the path to interoperability progress quite clear. We need to identify the most important pieces of information to share today, in contrast to boiling the ocean. Fuchs asks his teams to articulate what is broken that needs immediate fixing.

The post 9/11 philosophy in the Intelligence Community is how to share the most important information that is currently not sharable. Compare this to what ONC's Doug Fridsma said about essentially viewing interoperability in the context of the information's end use value. If health care systems want to exchange data with meaning, it can be a real challenge. So think about a simple use case such as sending a secure PDF file of a patient's discharge information. That could be something that could happen right now. We clearly heard that health systems really want this right now. They spend a lot of money on proprietary information technologies only to find that they aren't interoperable. They can make this simple use case happen by putting it in as a requirement in their next round of Health IT RFPs¹³.

If health care systems want to exchange data with meaning, it can be a real challenge. So think about a simple use case such as sending a secure PDF file of a patient's discharge information. That is something that could happen right now.

And since we are growing our wish list with multi-stakeholder ecosystem R&D, and prioritization of what information we want to make exchangeable and for what purpose, how do we go to the next level after that? How do we think about putting the pieces together and transforming the consumer and clinician "interoperability experience?" Malcolm Gladwell suggests digital transformation in the music industry as a fine interoperability example to emulate. We went from music

⁹ Joe Smith, MD, Chief Medical Officer and Chief Science Officer, West Health

¹⁰ Michael Jones, MD, Chairman, Center for Medical Interoperability (affiliated with West Health Institute)

¹¹ William Check, PhD, SVP and CTO for National Cable & Telecommunications Association

¹² Sid Fuchs, President, MacAulay-Brown

¹³ Glenn Tobin, PhD, CEO, Crimson, The Advisory Board Company

trapped in silos of what delivers it (record player, cassette, boom box, car stereo, etc.) to a model of you moving continuously with your music (wherever you want it delivered and how you want it delivered). What made digital music successful? It required a paradigm shift from music just getting stored in analog (records, cassettes) to getting stored digitally (CDs) to transforming how music would be bought (song by song in iTunes) to how it would be stored and played (iPod, iPhone) ultimately transforming the user experience of music in people's lives. Hence the technology innovation lived within a business ecosystem innovation¹⁴.

Capturing the Value: Veteran Administration's Blue Button, App Empowered Consumers and Knowledge Empowered Clinicians

The lack of interoperability costs us. There is value (patient safety) left on the table. There is value (interface cost) left on the table. There is value (clinician time cost) left on the table. Indeed, studies from West Health Institute¹⁵ predict that medical device interoperability can reduce US healthcare costs by \$30 billion per year. This is over 1% of the \$2.8 trillion total costs of U.S. health care, or alternately, 4 percent of the \$750 billion estimated total waste in U.S. health care. But in a multi-stakeholder ecosystem such as US Healthcare, who really gets the calculable ROI of reduced medical errors and reduced physician time that can withstand an ROI analysis¹⁶ is always a tough call and one that ACO models are intended to address in the long term.

So how do we start to capture the value left on the table today? Can health care tap into the Apple-like creativity and energy that transformed the music industry to release the value trapped in organizational information silos? There is a big opportunity (with value accruing to patients, providers, payers and vendors) when patients get access to their information across organizational silos. Indeed, one Healthcare Innovation Day panelist said Microsoft HealthVault was a great idea that may have been five years too early. Now, there's a wonderful opportunity with the Veterans Administra-

tion's Blue Button¹⁷ for getting the patient's data to follow them. Building on what Dr. Fridsma of ONC said, vertical integration has reached the limits of complexity. Let patients and families apply apps (developed around VA Blue Button standards) to their own health care data. FDA¹⁸ wants to promote "conformance with consensus standards" and regulatory frameworks to keep up with software development such as the apps marketplace. ONC¹⁹ is willing to be the convener (of the interoperability stakeholder ecosystem). So let ONC convene a session and charge one of its workgroups to catalyze widespread realization and adoption of this high value use case across the health care business ecosystem (including multiple health systems, regulators, app developers, traditional Health IT vendors, medical device manufacturers, consumers and clinicians).

In the figure below we illustrate the above use case of interoperability and Organizational Learning²⁰ (via VA Blue Button and app empowered consumers and clinicians) fostering a Learning Health System^{21 22} (with this perspective on IOM's Learning Health System described briefly in the caption and in more detail elsewhere²³). It is time to enable consumers to securely access and interoperably distribute their health information to their clinicians of choice — placing once again the consumer clinician relationship (i.e. people²⁴) at the center of our health system. It is time for horizontal integration in which patients carting around manila folders (a "physical sneaker net") can be replaced with a set of apps facilitating a "virtual sneaker net" — your most relevant health information, from information systems and medical devices, in context and ready to put in your clinician's hands so she can make safe data driven decisions.

¹⁷ <http://www4.va.gov/bluebutton/>

¹⁸ Jeffrey Shuren, MD, JD, FDA Center for Devices and Radiological Health

¹⁹ Jodi Daniel, director of the office of policy and planning, U.S. Dept. Health & Human Services, Office of the National Coordinator for Health IT

²⁰ Peter Senge, *The Fifth Dimension: The Art & Practice of the Learning Organization*, Random House, March 2010

²¹ <http://www.iom.edu/Activities/Quality/LearningHealthCare.aspx>

²² Institutes of Medicine Committee on Learning Health Care System in American, *Better Care at Lower Cost: The Path to Continuously Learning Health Care in America*, Sept 6 2012

²³ Richard Singerman, *Accelerating Healthcare Value: Innovating Our Way Toward a Learning Health Care System*, *Bloomberg BNA Health IT Law & Industry Report*, June 4, 2010

²⁴ Anwer Aqil, Theo Lippeveld, and Dairiku Hozumi, PRISM framework: a paradigm shift for designing, strengthening and evaluating routine health information systems. *Health Policy Plan*, 24(3), 217-228, May 2009

¹⁴ Mark W. Johnson, Clayton M. Christensen, Henning Kagernmann, *Reinventing Your Business Model*, *Harvard Business Review*, Dec 2008

¹⁵ Nick Valerian, CEO, West Health

¹⁶ Julia Adler-Milstein, Gregory Daniel, Claudia Grossmann, Chad Mulvany, Rachel Nelson, Eric Pan, Valerie Rohrbach, and Jonathan Perlin, *Return on Information: A Standard Model for Assessing Institutional Return on Electronic Health Records*, Institutes of Medicine, Jan 6 2014

Figure: Interoperability Fostering a Key Use Case for a Learning Health System — Leveraging Veteran’s Administration Blue Button to Create App Empowered Consumers and Knowledge Empowered Clinicians

(A) The Learning Health System can be visualized as follows. Knowledge intensive assets of People, Process, Technology and Relationships are converted by Innovation Engines (orange colored “I”) into Quality, Community Health and Cost outputs (CMS Triple Aim targets) by consumers and clinicians individually and the Health System as a whole. All the while, the consumer and clinician mutually learn from each other as well as enabling overall Health System learning. (B) One of the trickiest parts of this Organizational Learning paradigm, however, is that consumers, clinicians and the Health System as a whole each have their own definitions of Quality, Community Health, and Cost. (C) Within the purple arrows, starting at the left, we see patients access their health data from VA/CMS via VA Blue Button. Next, the patient has the ability via apps (in conformance with FDA-facilitated consensus standards) to securely share his health data with any clinician. And part of the app consensus standard is to make that data easily understandable to clinicians. Finally, in the bottom purple leg of the triangle, the clinician can then make data driven decisions at the right time. This results in reduced missed diagnoses, reduced preventable errors, reduced duplicative tests, reduced clinician time and/or reduced time to treatment—all contributing to higher quality, healthier communities, and lower costs.

